

# Kingwood Branch Library

A LIBRARY IN THE LIVABLE FOREST

A Joint-Venture Between  
Harris County and City of Houston

MAY 25, 2007





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# new kingwood branch library

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## GENERAL OVERVIEW

This building program is designed to be used as a preliminary guide in building a new 40,000 square foot library to replace existing Harris County Public Library Kingwood Branch Library.

## LIBRARY MISSION STATEMENT

Harris County Public Library provides information and resources to enrich lives and strengthen communities within and beyond our walls.

## LIBRARY OVERVIEW

The new Library will be located on a site off of Lake Houston Parkway, south of Kingwood Blvd. It will serve residents seeking information through traditional print materials, audio-visual materials or through the Internet, informational databases and programs. The Library will also be a meeting place for organizations and groups throughout northeast Harris County and will be a site for video conferencing.





## GENERAL PLANNING

This new library should be designed so as to give the staff the opportunity to successfully merchandise materials and services. As a public building it should be imposing and distinctive, while at the same time providing a compelling invitation to enter, to read, and to browse. The library's customers should be as invigorated by the library's environment as by what they find there to read; the library should delight their senses as much as it delights their minds. Only by making the library uplifting in both form and substance can it be totally effective and totally enjoyable.

The building should be functional, usable, and attractive. The bottom line for any library facility is space for its materials, and public access computers. Designers, architects, and planners should not lose sight of the fact that books, materials, videos and computers are the reasons that the library exists in the first place. The second priority is space for users to use the library. Libraries with little room for users lose their customers, the very people who pay to keep the library open, and for whom the library was created. The space for users must include rooms for large and small meetings, as well as rooms that could be used for quiet study. The third priority is space for the staff.

## Planning/Review Team

In any planning for a joint project between Harris County and the City of Houston, the architect will need to consult with a Planning/Review Team composed of designated staff from these departments:

- Harris County Precinct Four
- Harris County Public Library
- Harris County Public Infrastructure Department
- Houston Public Library
- City of Houston, Building Services Department

The Director of the Harris County Public Library and designated staff will be key members of this planning team, as will be the Architect of the project.

## The Building

This program calls for a new 40,000-square foot, two-story building. It will ultimately house approximately 150,000-175,000 traditional library materials, have more than 80 computers for public use and seat over 200 customers.

Although internal space requirements are functionally related and defined in this program, the building should be designed so that future interior arrangements can be made with a minimum of difficulty. Interior design and furnishings must allow for future change with inexpensive modifications. Load bearing partitions should be kept to a minimum. Walls at angles other than 90 degrees are not recommended unless they can be planned without loss of shelf space.

Although the library will take advantage of using wireless technology, wiring for computers and video conferencing should be provided. Depending on the locations of computers throughout the building it might be necessary to have several wiring closets located in the public area of the library on the first and second floors. Conduits for electrical outlets, data lines and telephone connections should be planned for every room, computer station, staff station, meeting room and office; and coax cable connections should be planned for the meeting room, conference room, children's activity room and classroom.



Lighting throughout the library is of utmost importance. Different foot-candles of light may be required for the stacks, computers, circulation area, meeting room, offices, and seating space for the public.

One public entrance is required. The architects should remember the merchandising aspect of the public library design. Because of the high annual rainfall of the Gulf Coast, a covered public entrance and staff entrance is recommended.

Restroom facilities, public telephones, elevators, water fountains, doorways and the entrance and exit facilities should be in accordance with ADA.

The building should have a master lock system, fire alarms, smoke detection and two security alarms: one for the meeting room/foyer area and one for the public area.

There should be a lockable outside hose bib outlet on each side of the building as well as lockable electrical outlets.

### PUBLIC AREAS OF THE LIBRARY

The public area of the library will house the traditional book collection as well as personal computers with access to the Internet, databases and the Library's catalog of materials. Customers will be able to sit at tables, carrels or in lounge chairs located throughout both areas. It will also house 4 or 5 study rooms, a meeting room, a conference room, a computer training room and a children's activity room. It will be divided into two major areas: Adult Services on the second floor and Children's Services on the first floor. It will be necessary to design these areas so that the Information Work Stations in both areas have visual control of each individual area.

As a customer enters the public service area of both the first and second floors, he/she will enter a transitional area where the library will merchandise library materials, publicize special programs or have special exhibits. On the first floor this will be a part of the General Information Area which is adjacent to the circulation desk. On the second floor this area will actually be in the adult area of the library. Shelving units with display shelves and slat wall shelves are needed as well as colorful cloth bulletin boards. The exhibit area might have a built-in exhibit case, wall space for hanging pictures and lounge chairs that may be moved when a larger exhibit is featured.

The photocopy center will open off the general information area on the first floor and a photocopy center and conference room will open off the adult area on the second floor.

### Parking

The function of parking is to make the library accessible to the users who will come by car to the library. Although the Houston code required only 48 parking spaces (1.2 per 1000GSF), at least 220 parking spaces will be required to adequately serve this facility.

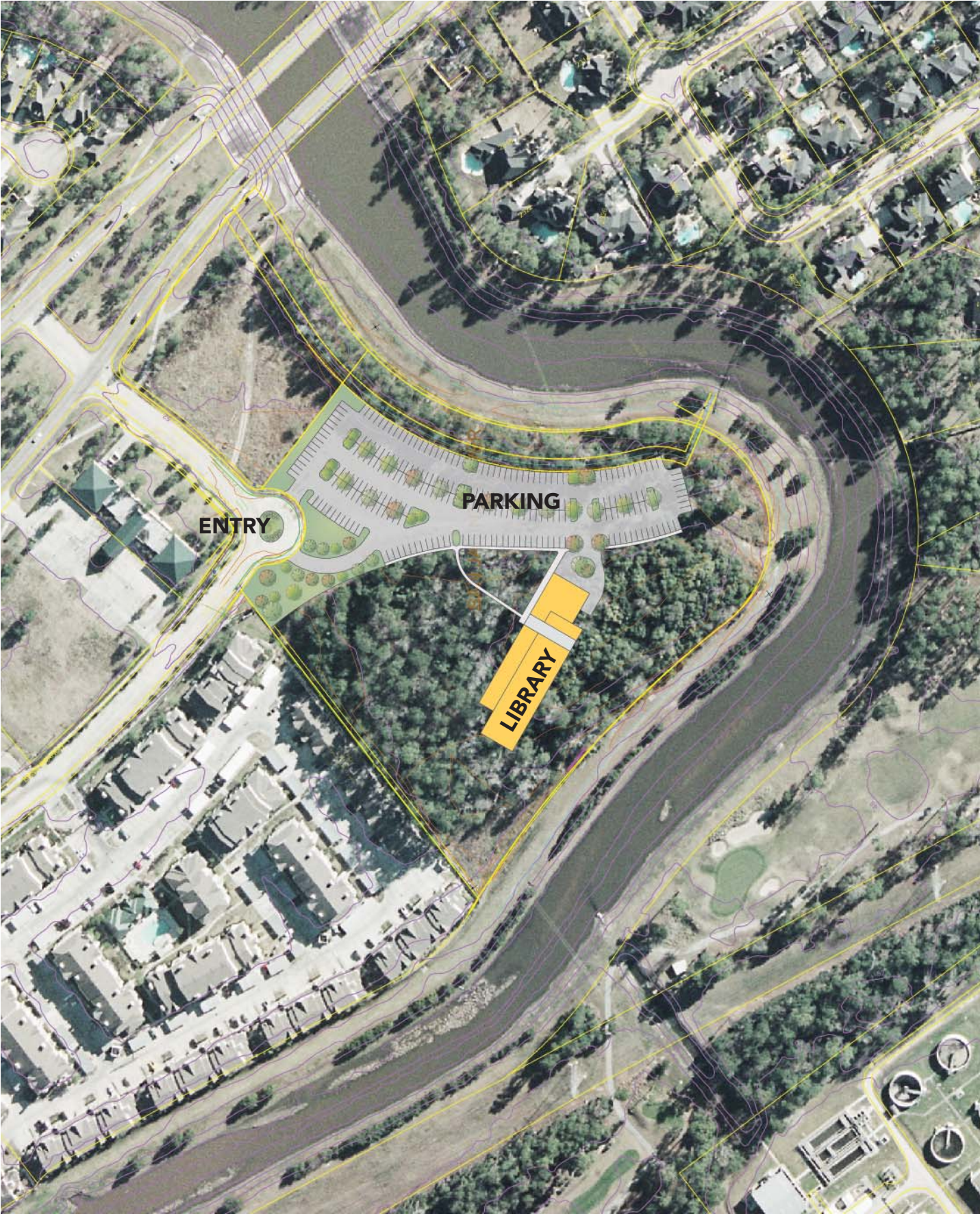
A minimum number of the spaces near the main entrance should be designated as handicapped. Twenty-five additional parking spaces should be designated for the staff adjacent to the staff entrance of the library. These spaces should be designated with signs.

Since the library will be open at night, care should be taken that the parking areas are well lighted.

**AREAS**—The areas designated for specific functions and their sizes are based on requirements for the effective and efficient operation of the library. Square footage may change based on recommendations of the planning/review team and architect.

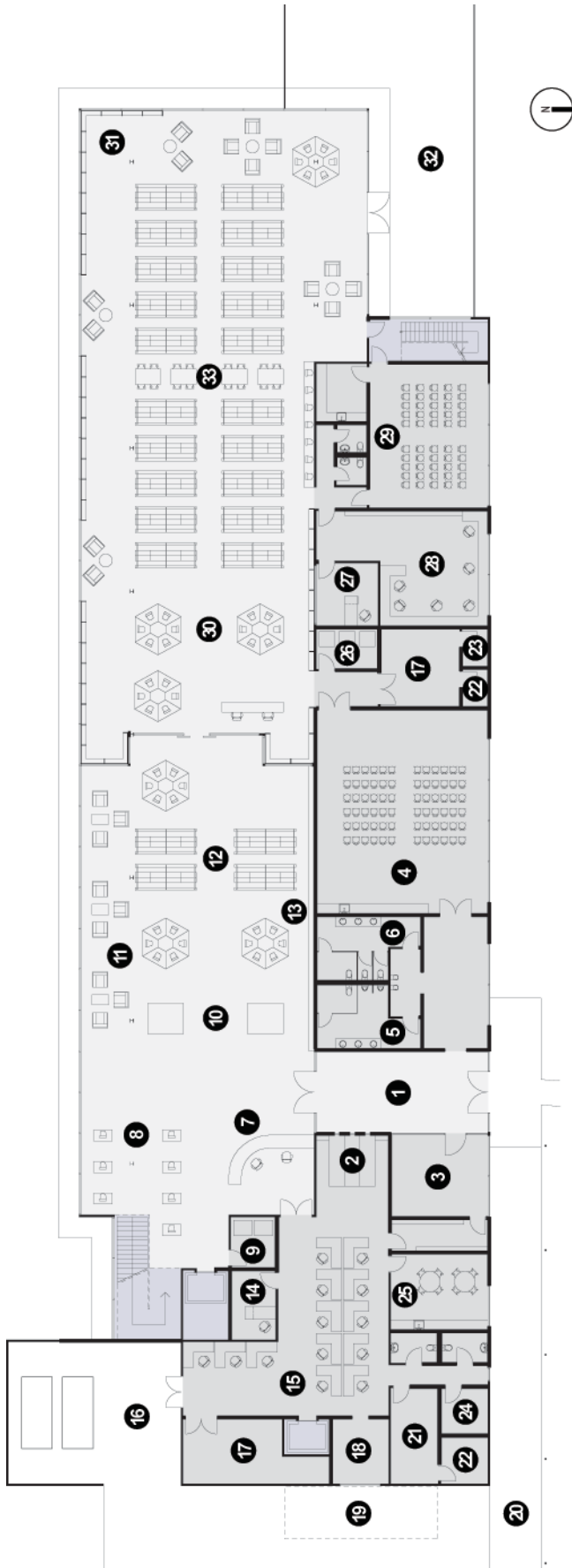
<b>AREA</b>	<b>SQUARE FEET</b>
<b>FIRST FLOOR</b>	<b>21,162</b>
Main Entrance and Foyer	400
Friends Room	400
Meeting Room	1,400
Public Rest Rooms	448
Circulation Area	1,900
Circulation Manager	100
General Information/Transitional Area	1,400
Photocopy Center	100
Elevator/Public	200
Stairs (2 @ 100 sq. ft. each)	200
Drive Through Drop Room	180
Staff Workroom	2,000
Storage	210
Janitor's Room	100
Wiring Closet	72
Electrical Closet	72
Staff Rest Rooms (2 @50 sq. ft. each)	100
Staff Kitchen	300
Librarian's Office	150
Mechanical Room	400
Vending Machine Area	100
Children's Services Area	
Reference and Information Center	750
General Children's Non-Fiction/Fiction Collection	6,000
Children's Librarian Office	150
Children's Services Workroom	500
Children's Activity Room	800
Children's Rest Rooms	144
15% circulation factor	2586
<b>SECOND FLOOR</b>	<b>18,832</b>
Foyer	200
Public Rest Rooms	448
Stairs (2 @ 100 sq. ft. each)	200
Elevator	200
Mechanical Room	400
Janitor's Closet	50
Wiring Closet	72
Transitional Area	200
Photocopy Center	200
Conference Room	250
Computer Training Room	700
Vending Machine Area	100
Adult Services Area	
Study Rooms (5 @ 81 sq. ft. each)	405
Reference/Information Center and Collection	2,700
Adult Services Office	625
Staff Rest Room	50
Assistant Librarian-Public Services	150
General Adult Non-Fiction/Fiction Collection	7,500
Magazine Area	500
Young Adult Area	1,100
15% circulation factor	2282
<b>TOTAL SQUARE FOOTAGE</b>	<b>39,994</b>





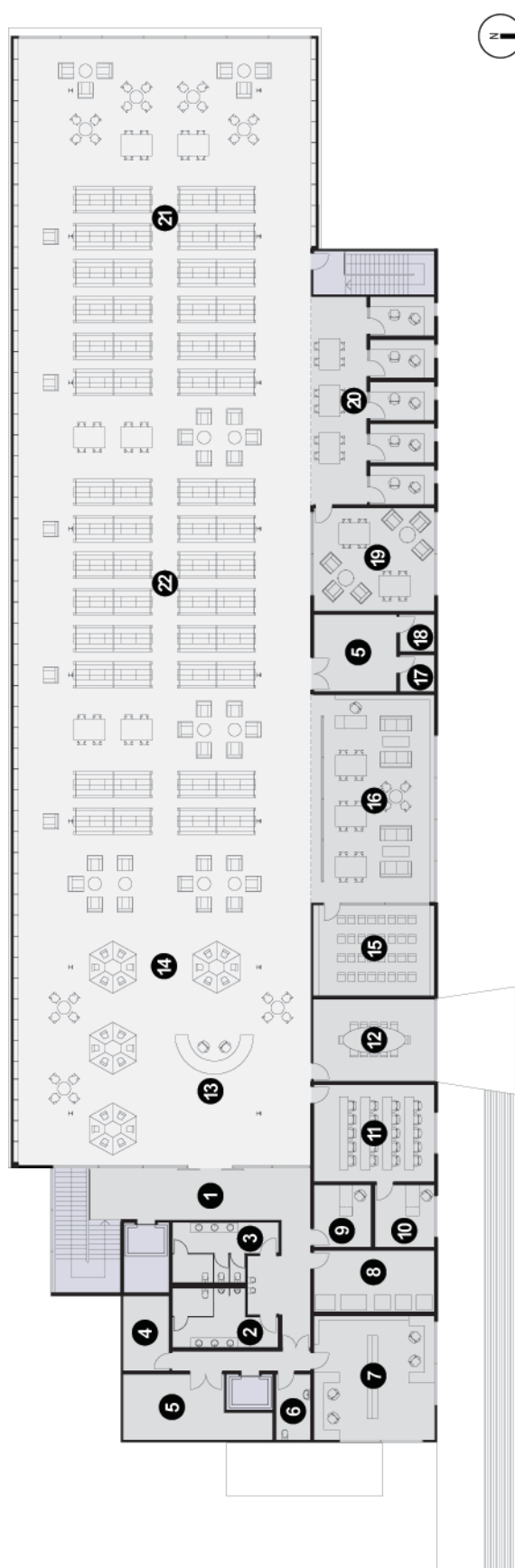


# floor plan, first floor

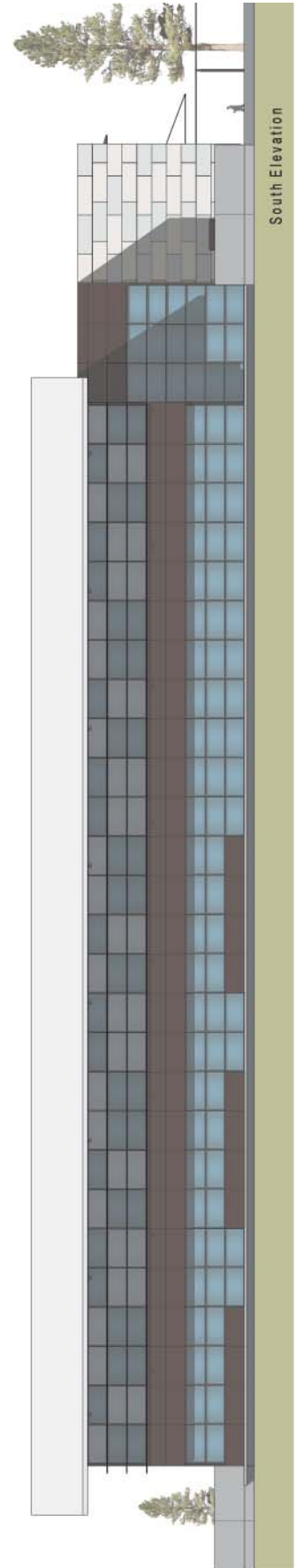
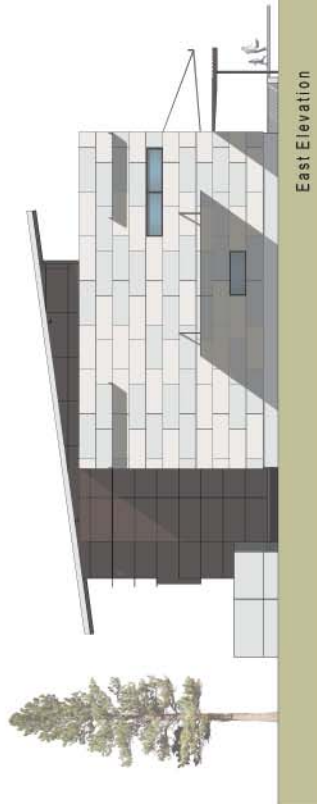
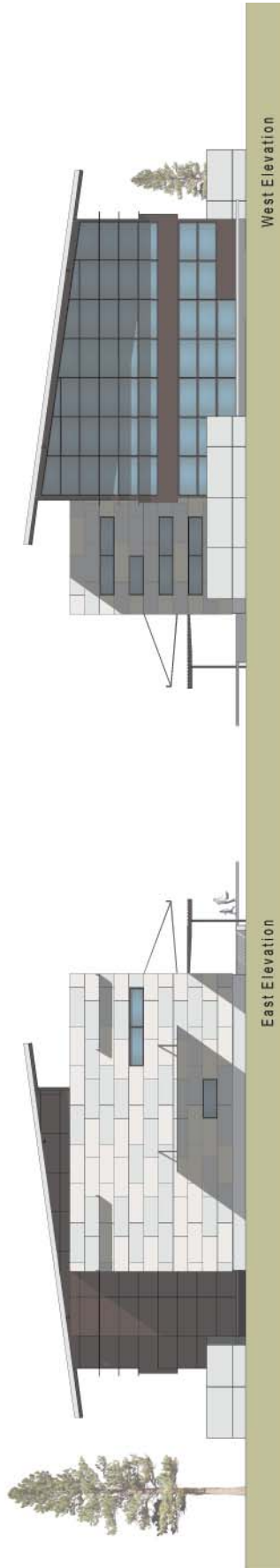
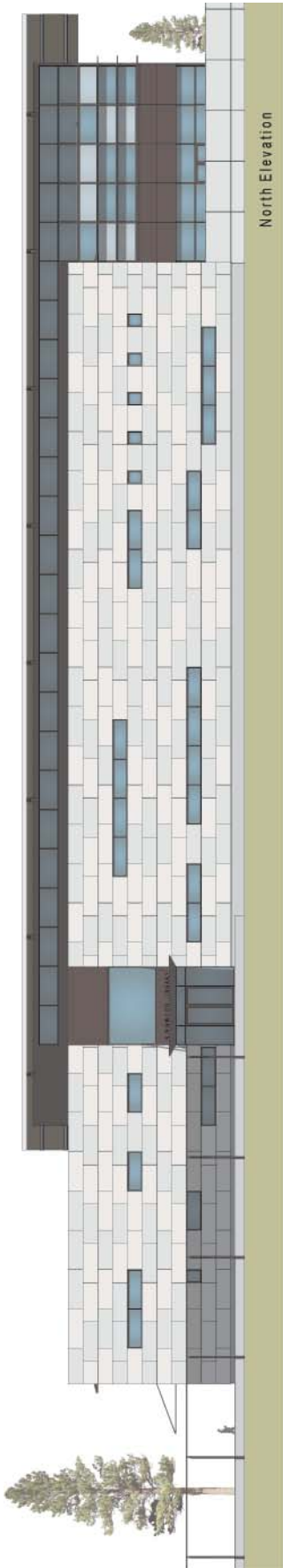


- |                                  |                         |                                  |   |
|----------------------------------|-------------------------|----------------------------------|---|
| 1 LOBBY                          | 10 DISPLAY AREA         | 19 COVERED BOOK DROP / PICKUP    | 28 CHILDREN SERVICES WORKROOM                                       |
| 2 BOOK DROP                      | 11 INTERNET LOUNGE      | 20 COVERED DROP OFF / ENTRY RAMP | 29 CHILDREN'S ACTIVITY ROOM   |
| 3 FRIENDS ROOM / FRIENDS STORAGE | 12 CD / DVD / VHS AREA  | 21 STORAGE                       | 30 CHILDREN'S COMPUTER SPACE  |
| 4 MEETING ROOM                   | 13 HOLDS AREA           | 22 ELECTRICAL CLOSET             | 31 TODDLER AREA   |
| 5 MEN'S ROOM                     | 14 LIBRARIAN'S OFFICE   | 23 WIRING CLOSET                 | 32 COURTYARD  |
| 6 WOMEN'S ROOM                   | 15 STAFF WORKROOM       | 24 JANITOR'S CLOSET              | 33 GENERAL CHILDREN'S REFERENCE<br>NON-FICTION / FICTION COLLECTION |
| 7 GENERAL INFORMATION AREA       | 16 SERVICE AREA         | 25 STAFF KITCHEN                 |   |
| 8 EXPRESS CHECK-OUT              | 17 MECHANICAL ROOM      | 26 COPY CENTER                   |   |
| 9 VENDING                        | 18 DRIVE THRU DROP ROOM | 27 CHILDREN LIBRARIAN'S OFFICE   |   |





- |    |                           |    |               |    |   |
|----|---------------------------|----|---------------|----|---|
| 1  | FOYER                     | 19 | QUIET ROOM    | 22 | GENERAL ADULT REFERENCE<br>NON-FICTION / FICTION COLLECTION |
| 2  | MEN'S ROOM                | 20 | STUDY SPACES  |    |   |
| 3  | WOMEN'S ROOM              | 21 | MAGAZINE AREA |    |   |
| 4  | JANITOR'S CLOSET          |    |               |    |   |
| 5  | MECHANICAL ROOM           |    |               |    |   |
| 6  | STAFF RESTROOM            |    |               |    |   |
| 7  | ADULT SERVICES OFFICE     |    |               |    |   |
| 8  | COPY CENTER / VENDING     |    |               |    |   |
| 9  | LIBRARIAN'S OFFICE        |    |               |    |   |
| 10 | COMPUTER TRAINER'S OFFICE |    |               |    |   |
| 11 | COMPUTER TRAINING ROOM    |    |               |    |   |
| 12 | CONFERENCE ROOM           |    |               |    |   |
| 13 | INFORMATION CENTER        |    |               |    |   |
| 14 | COMPUTER SPACE            |    |               |    |   |
| 15 | TEEN MEDIA ROOM           |    |               |    |   |
| 16 | TEEN AREA                 |    |               |    |   |
| 17 | ELECTRICAL CLOSET         |    |               |    |   |
| 18 | WIRING CLOSET             |    |               |    |   |



















## SITE

### Location and Description:

The Kingwood Library is located on the SW quadrant of a 9.12-acre site where 75% of the site is a dense, forested area. The site was designed to minimize the impact in the forest area.

The final solution uses all of the site open area for parking (25%) and takes 5% of the area for the building, leaving 70% of the site as green space.

The building will contain 40,000 GSF within a two-story structure with a building footprint of approximately 20,000 GSF.

### Sitework:

Landscape: Existing trees will remain where practical, new landscape area for seasonal planting at site entrance.

### Hardscape:

All new sidewalks will be concrete with accent pavers at building entrance.

## BUILDING

### Exterior Finishes:

Wall: Fiber reinforced cement panels, "Swisspearl" rain-screen system

Curtainwall: Painted aluminum system with 1" insulated glass w/low E coating and light grey tint.

Entries: Concrete pavers, aluminum canopy w/metal panel soffit.

Roof: Standing seam metal roof, wood soffit

Exterior Patios: 8" hone finished CMU, concrete pavers

### Interior Finishes:

Administration area, meeting rooms, study area, work rooms: carpet tile, rubber base, painted gyp-board walls, 2x2 acoustical ceiling tile 9' high.

Open reading rooms 1st floor: carpet tile (over raised floor), rubber base, painted gyp-board walls, 2x2 acoustical ceiling tile 12' high.

Open reading rooms 2nd floor: carpet tile (over raised floor), rubber base, painted gyp-board walls, and exposed roof structure w/ wood panel ceiling.

Monumental stair: painted steel stair, carpet treads & risers, stainless steel rails.

Service stair: carpet tile, rubber base, painted gyp-board walls, 2x2 acoustical ceiling tile

Toilet rooms: 12"x12" porcelain tile, granite counter, floor mounted painted metal partition, painted gyp-board ceiling.

Mechanical rooms: Exposed sealed concrete floor, painted gyp-board walls, exposed ceiling.

Door: Plastic laminate, solid core wood doors 9'-0" clear aluminum frames.

## I. GENERAL CIVIL DESIGN CRITERIA

### **Water**

The water distribution will have two points of connection, one on Bens Branch Drive and one on the 12" waterline located in an easement on the south side of the site. A 6" waterline will loop through the site and allow a fire hydrant to be placed near the northwest side of the entrance drive. A 2" domestic water line will connect to the loop and service the building.

### **Sanitary**

The 6" sanitary sewer service will connect to an existing manhole on the north side of Bens View Lane. This line will need to be bored under the existing pavement of Ben's View Lane; the length of the bore will be approximately 110 linear feet.

### **Detention**

The waste water capacity letter from the City of Houston stated that detention will be required at a rate of 0.2 acre feet per acre of impervious area. We have provided a cost for a small detention pond in the cost estimate. However, it is our belief that the detention requirement can be waived once the site plan is finalized and drainage calculation are provided to the City.

### **Storm Water**

The parking area will be served by an internal drainage system consisting of pipes ranging in size from 10" to 24". The storm sewer system will connect to an existing manhole on the south side of Bens Branch Drive, it will parallel the main entrance drive in order to minimize the impact on the existing wooded areas.

The storm water runoff from the building will sheet flow across the site via small natural appearing swales and will collect in small area drains connected to the parking area drainage system.

### **Pavement/Parking**

The parking area will consist of 91,200 square feet of 6" concrete paving. This will accommodate approximately 240 parking spaces. A small portion of the parking lot is in the flood plain therefore, any fill placed in the flood plain will need to be mitigated on-site. Mitigation for the parking lot can occur in the most southerly portion of the site and will not affect the current pavement or building layout, additionally this mitigation will not affect any wooded areas.



**I. GENERAL MECHANICAL DESIGN CRITERIA**

**A.** Design Criteria for the normally occupied spaces shall be in accordance with International Building Code, Uniform Mechanical and Plumbing Code: (UMC - 2003) and (UPC - 2003).

**B. Design Parameters, Internal Factors:**

1. Occupancy factor shall be based on ASHRAE 62-1999 recommendations.
2. Lighting heat factor shall be based on 1.5 W/SF average per International energy code.
3. Office equipment heat factor shall be based on 2.0 W/SF average for office portion.
4. Outdoor air shall be introduced at the rate of 15 CFM per occupant.
5. Heating design calculations shall include no credit for solar, occupant, lights or equipment heat.

**C. Energy Conformance**

1. Building envelope shall be designed to meet the IEC – 2003 requirements.
2. HVAC equipment efficiency and performance shall be selected in accordance with the IEC – 2003 requirements.
3. Thermostatic controls for automatic set back shall be provided in accordance with IEC – 2003 requirements.
4. Ductwork sealing and insulation shall be provided in accordance with the IEC – 2003 requirements.

**D. Cooling System Description**

1. Air-cooled chillers shall be used to serve various air-handling units in the building. Air-cooled chillers and associated chilled water pumps shall be located within a fenced chiller yard at grade level.
2. Floor level 1 and 2 shall be provided with two (2) air-handling units each with variable frequency drives (VFD) control.
3. A 30% efficient pleated filter and a 65% efficient rigid filter shall be provided for each air-handling unit.
4. Exterior and interior zones shall be provided with a separate fan powered variable air volume (VAV) terminal units with electrical heating. Other space such as reference / library room, conference rooms, children activity rooms and other enclosed offices such as director's office and administration offices shall be provided with a separate fan powered VAV terminal units with electrical heating for each space.
5. The air-handling units shall be located in the mechanical room on each floor level where as the air-cooled chillers and associated pumps shall be place outside the building at grade level within a service / chiller yard area.
6. IT rooms and any other areas of the facility such as stacks requiring 24 hours cooling shall be served by a separate and independent air-conditioning system.
7. Outside air shall be provided through a 100% outside air pre-treatment unit located on roof level and then ducted down to each of mechanical rooms. Outside air dampers shall

modulate intake air volume to maintain CO2 level of 1000 ppm (field adjustable) in the common return air plenum.

8. Restrooms and janitor closets shall be provided with ventilation in accordance with code and prudent practice requirements.

#### **E. Heating System Description**

1. All conditioned spaces shall be provided with electrical heating integrated with fan powered VAV terminal units for each space.

#### **F. Supply Air Distribution**

1. For areas with a lay in ceiling, supply air shall be distributed from air-handling unit located on that floor through medium pressure ductwork to fan powered VAV terminal units; and than through low velocity ductwork between VAV terminal units and supply air diffusers to each space / zone.
2. Diffusers and grilles shall be selected for optimum airflow at acceptable noise levels, with care taken to ensure a pleasing appearance to match interior finish and ceiling construction.
3. Return air shall be drawn back to the main air-handling unit through the return air plenums etc., via return air grilles as necessary.
4. All supply air ductwork shall be galvanized steel with external foil faced fiberglass wrapped insulation with minimum insulation value of R-5 to meet the International Energy Code. No Fiberglass internal insulation shall be permitted.
5. Duct shall be manufactured per SMACNA standards.
6. All supply ductwork conveying cold air shall be sealed and insulated per the new energy code (IEC – 2003) and City of Houston requirements.
7. Stack areas equipped with raised floor shall receive supply air from under floor air distribution system. Return air shall take overhead path to related AHU in mechanical room.

#### **G. Ventilation and Exhaust**

1. Outdoor air shall be introduced to each air-handling unit serving on each level. Each unit shall supply a minimum of 15 CFM per occupant for high occupancy areas such as stacks, meeting rooms, children and teen activity area, computer training rooms and 20 CFM per occupant for the administration / office space use. Additionally CO2 detectors shall be provided in the return air to modulate the out door air supply as required but still maintaining a minimum level of 1000 PPM (adjustable) in the space.
2. Separate, ducted exhaust system shall be utilized for restroom, janitor closets, and other general exhaust. Exhaust fans located at the highest roof level.

#### **H. Water Distribution System**

1. The central chilled water system shall consist of primary / secondary pumps with constant volume water distribution through the primary system, and variable volume system for the



secondary distribution through the air-handling units.

2. The water flow through the chiller shall be constant flow with dedicated chilled water pumps for each chiller. Secondary chilled water pumps shall be arranged for 100% duty / standby configuration.
3. Cooling coils in the air-handling units shall be sized to match building cooling requirements.
4. Chilled water piping material shall be schedule 40 black steel with threaded joints for pipe sizes up to and including 2 ½ ". Larger pipe joints shall be welded connection. Victaulic connections may be allowed only at the equipment joints locations.
5. Chilled water piping insulation shall be close cell type similar to KoolPhen K® Phenolic Foam Insulation. Fiberglass insulating material shall not be used for chilled water piping.

#### **I. Automatic Temperature Control**

1. The HVAC control system shall be microprocessor based, DDC/electronic sensing and pneumatic actuation. The computer based system shall have a central console with local stand-alone DDC control panel. Operating sequence of all major equipment shall be pre-programmed into the system. All major HVAC equipment, life safety equipment and other miscellaneous equipment status shall be monitored on the central computer/console.
2. Local electrical heating coils installed within the fan powered VAV terminal units shall control the zone/room temperature as required. Normal safety controls and freeze protection shall be provided for outside air supply units.

#### **II. GENERAL ELECTRICAL DESIGN CRITERIA**

- A. Electrical system for new building shall consist of primary power supplied by Power Company, from pad or pole-mounted transformer, and an underground secondary feeder from transformer location to main electrical panelboards.
- B. Electrical system proposed shall consist of 277/480 Volt primary and 120/208 Volt secondary system. Primary electrical distribution system will be used for lighting and HVAC load and secondary system will be utilized to serve appliance, receptacles, and other small load.
- C. Electrical system size will be calculated in accordance with project current requirements plus 20% for future growth. Electrical system will be designed in strict accordance of National Electrical Code (NEC), as well as other applicable local codes including Energy Codes.
- D. General lighting will consist of decorative direct/indirect fluorescent fixtures equipped with fluorescent lamps, and electronic ballasts. Fluorescent lighting shall be complemented by open or lensed compact fluorescent down lights in conference meeting rooms, lobbies, etc. Emergency egress lighting shall be provided by means of emergency operated ballast for duration of time required by code.
- E. All equipment shall be new and constructed in accordance with NEMA (National Electrical Manufacturer Association), ANSI (American National Standard Institute) and IEEE (Institute of Electrical and Electronic Engineers). All equipment shall carry UL labels.
- F. A sufficient number of circuit breaker type lighting and power panel boards shall be provided to accommodate branch circuit requirements. Panel boards shall be installed for a group of loads physically separated from other loads, or for a cluster of load performing a particular function.

Panel boards shall be installed as close to the load group / function as possible. 120/208V panel boards shall be provided for branch circuit requirements of 120V, single-phase load. Outdoor panel boards shall be equipped with NEMA 3R enclosures and indoor panel boards will be installed in NEMA 1 enclosures. All breakers will be of thermal magnetic type and of quick break style. All buses shall be copper.

- G. Wiring devices of appropriate configuration shall be provided for various loads. Dedicated and/or isolated ground branch circuits shall be provided to the loads and receptacles as required. Devices shall be coordinated for rating and shall be installed in accordance with ADA requirements.
- H. Provision for telephone and data services shall be installed. Wall mounted outlets with pull strings shall be installed for future pulling of telephone and data cabling. Suitable size conduits will be installed as required to carry the major cable runs between telephone/data rooms and end users.
- I. Fire Alarm System – A new intelligent, addressable fire alarm system also capable of monitoring security requirements for the facility, in accordance with NFPA, ADA, and local codes shall be designed. Each mode shall be able to function independently and shall be networked with other modes to form a complete networking system. The system shall include, but is not limited, to the following devices in all locations required by code:
  - 1. Manual Pull Stations
  - 2. Ceiling Smoke Detectors
  - 3. Duct Smoke Detectors
  - 4. Alarm horns and strobes
  - 5. Connection to sprinkler system flow and tamper switches
  - 6. Magnetic door holders (if required)
  - 7. Remote annunciator
  - 8. Connection to security devices at doors and windows as required
  - 9. Graphic Control Center.

All trouble signals and alarms shall be reported to owner designated monitoring authority and recorded in the system memory.

### III. GENERAL PLUMBING DESIGN CRITERIA

- A. Codes and Standards – All systems shall be designed in accordance with rules and regulations of the City of Houston, Texas and uniform plumbing codes (UPC - 2003).
- B. Utilities - Domestic cold water will be supplied from City water main. Storm and sanitary sewers from the building will connect to existing City sewer.
- C. Design Criteria – All systems will be designed in accordance with Uniform Plumbing Codes (UPC-2003).
- D. Domestic Water Supply System:
  - 1. All domestic hot and cold water supply pipe work shall be type "L" hard drawn copper with wrought copper set fittings. All pipe work joints shall use 95-5 tin antimony solder. Domestic hot water shall be generated using electric domestic water heater.
  - 2. Building water supply system will be directly connected to City water main assuming



- adequate pressure is available for service.
- 3. Water flow requirements will be developed in accordance with the fixture unit method, as indicated in the Plumbing Code.
- 4. Wastewater flow requirements will be developed in accordance with the fixture unit method and Hunters curve.
- 5. Domestic cold water piping shall be insulated with fiberglass per IEC requirements.
- E. Domestic Hot Water System:
  - 1. Domestic hot water will be provided to all toilet room lavatories and janitor's closet mop sinks, and any other areas.
  - 2. A local electric water heater shall provide hot water for each restroom, supplying hot water at 110°F temperature.
  - 3. Domestic hot water piping shall be insulated with fiberglass per IEC requirements.
  - 4. Domestic hot water return pump shall be provided with operation timer per IEC.
- F. Sanitary Waste and Vent System:
  - 1. Sanitary and waste minimum slope 1/4" / 1'-0" for 3" or smaller pipes and 1/8" / 1'-0" for 4" or larger pipes as permitted by Code.
  - 2. Vents shall be sloped to drain.
  - 3. Waste drain pipe work from toilets and other areas shall be PVC Schedule 40 with solvent cement jointing for below-grade applications only.
  - 4. Sanitary pipe work above-grade shall be service weight cast iron with stainless steel and neoprene rubber clamps.
- G. Storm Drainage System:
  - 1. Minimum slope 1/8" / 1'-0", or as permitted by Code.
  - 2. Storm drainage will be provided, as required by Code. All areas receiving rainwater will be provided with drains, as required.
  - 3. Storm drainage shall be PVC Schedule 40 with solvent cement jointing for below-grade applications.
  - 4. Storm pipe work above-grade shall be service weight cast iron with stainless steel and neoprene rubber clamps.

#### IV. GENERAL FIRE PROTECTION DESIGN CRITERIA

- A. Entire building shall be provided with wet pipe sprinklers system in accordance with NFPA 13, Fire Marshal's requirements and other applicable codes.
- B. Sprinkler piping shall be ASTM A-106 or A-53, per NFPA 13, black steel schedule 40 for above ground application. Buried pipe shall be of same material but coated and wrapped.
- C. Fittings shall be threaded ANSI 16.3 for pipe sizes up to and including 2 inch. For larger sizes, joints shall be welded fittings, ANSI 16.9 or Victaulic joints with style 77 flexible coupling. Flanges shall be screwed or welded neck-type ANSI 16.5. For flanges, gasket shall be 1/8" thick non-asbestos, binder garlock blue guard style 3200 ASTM F104. Fittings created by stretching or pipe expansion shall not be acceptable.
- D. Sprinklers heads for all areas shall be quick response and fully recessed heads (in areas with lay in ceiling) with white ceiling plates and 135°F temperature rating.

## I. General Description

The new Kingwood Branch Library will be a two-story structure situated on a 9-acre wooded site. The overall footprint of the building is approximately 85'x278' with the floor areas split almost equally between the 1st and 2nd floors. Elevation of the first floor is set approximately 2 feet above existing grade and elevation of the second floor will be at 16 feet above the first floor. Exterior finishes for the building include glass curtain walls and metal panels. Canopies will be located on the north and east sides of the building.

The following information will serve as an outline of the proposed structural systems and the structural design criteria that will be used for this project.

## II. Design Criteria

Building Code: 2003 International Building Code

Live Loads (reduced as allowed by the International Building Code):

Office Areas	50 psf + 20 psf partition load
Reading Rooms	60 psf + 20 psf partition load
Stack Rooms	150 psf (non-reducible)
Corridors and Stairs	80 psf
Mechanical Rooms	150 psf (non-reducible)
Roof	20 psf

Dead Loads:

Floor Structure	60 psf
Roof Structure	10 psf
MEP Systems	7 psf
Ceiling and Miscellaneous	5 psf
Sprinkler Piping	3 psf

Wind Design Criteria:

Basic Wind Speed	110 mph (3-second gust wind speed)
Wind Importance Factor	1.00
Building Category	II
Wind Exposure	B
Internal Pressure Coefficient	+/- 0.18

Design wind pressure for Main Wind Force Resisting Systems based on above criteria is approximately 25 psf. Minimum wind uplift 10 psf.

Seismic Design Criteria:

Seismic Design Category – A

Note: Wind loads govern over seismic loads in the Houston area.

Snow Load: Ground snow load,  $P_g$  is 5 psf or less.

### III. Structural Systems for the New Library

**Foundations:** The final building foundation design will be based on recommendations and design criteria provide by the project geotechnical engineer. Information provided in a geotechnical report prepared for a nearby building site indicates straight shaft piers were used at that location due to the high sand content of the soils. Building loads for the library however will be too high to use this type of foundation. It is anticipated that the foundations for the new library will consist of slabs-on-grade with column and exterior wall loads supported by spread footings bearing at approximately 6 feet below grade.

Perimeter grade beams will be designed to support the exterior wall systems and will be approximately 16" wide by 34" deep. The top of the grade beams will be set 8" below the finish floor. The floor slab will be 5" thick, reinforced with #4 bars at 15" on center, each way. Concrete slab will be underlain by a 15-mil vapor barrier and 2" of sand. Select structural fill will be used to raise the building pad to desired elevation. At curtain wall locations, the first floor slab will extend outside of the building line to form a continuous ledge around the library stack areas. Foundation walls and slabs at the elevator pits will be 10" thick. Pit depth will be 4 feet below finish floor.

**Second Floor Structure:** The structural system for the second floor structure will consist of 6-inch lightweight concrete on 3-inch composite steel deck. Beams and girders will be designed using composite action of the steel and concrete. This system satisfies U.L. D916 and provides up to a 1-hour fire rating. The steel beams are considered restrained for fireproofing considerations and therefore the U.L. design requires only that the beams and girders be fireproofed. Floor beams at the stack areas will be depressed approximately 24" to allow for installation of a raised floor system, which will provide space for under floor mechanical ductwork.

**Roof Structure:** The roof will consist of standing seam metal roof over structural steel deck. The deck will be supported by steel bar joists and wide flange beams. Roof joists or purlin beams will be spaced 5 to 6 feet on center. Steel wide flange columns will transmit roof and floor beam loads to the foundation. Steel beams in the stack area will be left exposed therefore specifications will include requirement that beams in this area meet AISC's requirements and tolerance limits for Architecturally Exposed Structural Steel (AESS).

**Special Construction:** Two elevators and two sets of stairs will provide access to the second floor. Main stair will be custom designed, while secondary stair will be specified as a standard pre-assembled steel stair. Stair treads will be concrete filled. To provide additional support for elevator guide rails, tube steel framing will be located around each elevator shaft from the ground floor up to the roof structure.

**Lateral Load-Resisting System:** A combination of welded rigid steel frames and chevron-shaped braced frames will provide resistance to wind loads. Moment frames will utilize complete penetration welds between the beam and column flanges. Continuity plates will be required between the column flanges at the beam-column joints. Braced frames provide a more efficient



and economical system of lateral resistance and will be used wherever possible. Braces will typically be constructed of hollow structural steel (HSS) tube members.

**Structural Steel Estimate:** The estimated weight of the structural frame is estimated to be 7 psf for the floor structure and 4 psf for the roof structure. The structural steel weight includes miscellaneous steel such as bent plates, gusset plates, mechanical opening frames and connection material. The estimated weight does not include the steel deck.

**Exterior Wall Construction:** The exterior walls will consist of a metal panel system on metal stud back-up. Exterior metal studs for height limits up to 14 feet will be 6-inch, 18-gage studs spaced at 16 inches on center.

#### IV. Outline Specification / Structural General Notes

##### REINFORCEMENT

1. Reinforcing Bars: ASTM A615, Grade 60.
2. Welded Wire Fabric (WWF): ASTM A185, 8-inch minimum side laps.
3. Adhesive for Dowels in Existing Concrete: HIT HY150 injection adhesive supplied by Hilti Fastening Systems, EPCON System Ceramic 6 Epoxy adhesive supplied by ITW Ramset/Red Head or approved equal.

##### CAST-IN-PLACE CONCRETE

1. Minimum 28-day Compressive Strength ( $f'_c$ ) of Concrete
  - a. Normal Weight Structural Concrete:  
Foundations and Slabs-on-Grade 3,500 psi
  - b. Lightweight Structural Concrete:  
(110-120 pcf fresh unit weight, 107-116 pcf air-dried unit weight)  
Slabs on Composite Steel Deck 3,500 psi

##### STRUCTURAL STEEL

1. Steel Shapes:
  - a. W-Shapes: ASTM A992
  - b. Angles, Channels and Plates: ASTM A36
  - c. Square/Rectangular Hollow Structural Sections (HSS): ASTM A500, Grade B
  - d. Round Hollow Structural Sections: ASTM A501 or ASTM A53, Grade B
2. Structural steel exposed to weather shall be galvanized.
3. Special welding procedures will be required for full-penetration moment connections. Weld inspection by ultrasonic method will be required.
4. Structural steel shall be fabricated and erected according to the AISC "Specification for Structural Steel Buildings – Allowable Stress Design" and the AISC "Code of Standard Practice for Steel Buildings and Bridges." Steel designated as "Architecturally Exposed Structural Steel" will meet AESS requirements of AISC.

5. Anchors, Bolts and Studs:
  - a. Anchor Rods: Headed A307 Bolts or A36 Rods with plate washer.
  - b. Expansion Anchors: Hilti Kwik Bolt II anchors, Trubolt Wedge Anchors, or approved equal. Minimum embedment = 6 times anchor diameter, unless noted otherwise.
  - c. Bolts:  $\frac{3}{4}$ " Diameter A325 High Strength Bolts.
  - d. Shear Studs:  $\frac{3}{4}$ " Diameter, headed.

#### COMPOSITE STEEL DECK

1. Steel deck shall conform to the requirements of the Steel Deck Institute (SDI) and the Contract Documents. 3" deep, 20-gage galvanized deck will be used for single spans up to 9'-6" and continuous spans up to 12 feet.
2. Composite floor members are designed to be unshored unless noted otherwise.
3. Composite floor slabs are to be finished level. The weight of the wet concrete will cause deflections of the steel framing, thus concrete overruns of approximately 10-15% are to be anticipated and included in the Contractor's Base Bid.



**City of Houston**  
New Kingwood Library

<b>Schematic Design Cost Estimate</b>		<b>Cost</b>	40,000 GSF \$/SF incl. OHP
Division 02	Site Work	\$850,000	21.25
Division 03	Concrete	\$400,000	10
Division 04	Masonry	\$50,000	1.25
Division 05	Metals	\$1,150,000	28.75
Division 06	Wood & Plastic	\$1,250,000	31.25
Division 07	Thermal & Moisture Protection	\$550,000	13.75
Division 08	Doors & Windows	\$800,000	20
Division 09	Finishes	\$750,000	18.75
Division 10	Specialties	\$200,000	5
Division 11	Equipment	\$120,000	3
Division 12	Furnishings	\$50,000	1.25
Division 14	Conveying systems	\$100,000	2.5
Division 15	Mechanical	\$1,850,000	46.25
Division 16	Electrical	\$800,000	20
includes 8% for GC + 4% Profit			
<b>SUBTOTAL</b>		\$8,070,000	\$202
10% contingency		\$807,000	
<b>Total Estimate</b>		\$8,877,000	\$222